

MEDUSAE COELENTERATA

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Abstract

A small collection of medusae was submitted from the Survey. This contained three species of Scyphomedusae, namely *Cyanea capillata* (Linné, 1758), *Catostylus mosaicus* (Quoy and Gaimard, 1824) and *Pseudorhiza haeckeli* Haacke, 1884, and one species of Hydro-medusae, *Bougainvillia ramosa* (Beneden, 1844). The last two species have not previously been recorded from Port Phillip Bay.

Introduction

A small collection of medusae submitted from the Survey comprised only four species, all previously known from the Indo-Pacific area, three being Scyphomedusae and one belonging to the Hydromedusae. A small amount of additional material of two species, *Catostylus mosaicus* (Quoy and Gaimard, 1824) and *Cyanea capillata* (Linné, 1758), from Port Phillip Bay has been included in this report; both were collected for other purposes during the period of the survey. Reference to the specimens of the latter species has been made by Kramp (1965: 260-1). The other two species are *Pseudorhiza haeckeli* Haacke, 1884, and *Bougainvillia ramosa* (Beneden, 1844), which have not previously been reported from Port Phillip Bay. All specimens examined by the author are given a serial number, prefixed by A, as a means of ready reference to notes made at the time of examination. These numbers have been placed immediately after the station numbers in the list of material. They are also used to identify individual specimens in the text.

Diameters are measured to the lappet edges (unless otherwise specified), the specimen being gently compressed by a piece of clear plastic enough to enable measurement. As specimens in preservative are not always perfectly circular, all larger specimens are measured in more than one diameter and the figures averaged.

Order SEMAEOSTOMEAE L. Agassiz, 1862

Family CYANEIDAE L. Agassiz, 1862

Cyanea Péron and Lescur, 1809

Cyanea capillata (Linné, 1758)

Pl. 1, figs. 1-4; Pl. 2, figs. 1-4.

Synonymy (part).

Cyanea annaskala Lendenfeld, 1882a: 465.

Cyanea capillata Stiasny and Maaden, 1943: 242, 244, 250. Cleland and Southcott, 1965: 149, 152.

Kramp 1961: 332-3; 1965: 260. For further synonymy see Kramp 1961, 1965 as quoted.)

MATERIAL: Survey Area 20 (124), A 705 A, B. 2 specimens A. disc diam. 117 mm; B. disc diam. 116 mm; A 1131 1 juvenile specimen disc diam. 30 mm. Area 55 (intertidal Mornington 9 June 1963) 1 specimen disc diam. 77 mm, R. Southcott Coll.; Area 7 (Elwood Beach, coll. S. Wiener, 2 Jan. 1961) A 457 (3 specimens). The Elwood Beach material was studied by Kramp 1965: 260-1, who recorded the specimens with a disc diam. of 37 and 85 cm respectively. Dr Wiener recorded (pers. comm.) that these jellyfish had been plentiful at Elwood Beach during the summer of 1960-61, adding "The tentacles of some specimens were 3-4 feet (1-1.3 m) long. Many jellyfish had no or very short tentacles . . . the tentacles caused pain, itchiness and erythema lasting for a few hours. [The medusae] are purple but the colour soon fades when they are removed from the sea".

This species has been listed a number of times for circum-Australian waters (Kramp 1965: 260-1; Mitchell 1962; Cleland and Southeott 1965) The first certain reference appears to be Lendenfeld (1882a: 465), who recorded it as a new species, *Cyanea annaskala*, from Port Phillip Bay. The species may be sufficiently numerous in the waters of Port Phillip Bay to be a nuisance to swimmers, causing skin and eye lesions (Mitchell 1962; Wiener 1961).

Classification and Morphology

The taxonomic revision of Stiasny and Maaden (1943) was accepted by Kramp (1965: 260), and all the specimens of *Cyanea* from S. Australia and Victoria forwarded to him by the present author were placed in *Cyanea capillata*. From this Kramp (1965) was able to say 'We can safely state that *C. annaskala* von Lendenfeld [1882] and *C. muellerianthe* Haacke [1887] are synonyms of *C. capillata*'. All specimens referred to in the present paper also answer to *C. capillata* by the criteria of these authors. As described by Stiasny and Maaden (1943), the rhopalar and tentacle pockets are separated by continuous septa, these being free from cross-connecting perforations (Pl. 1, figs. 3-4).

In the subumbrellar system it has not been possible to identify the projecting spaces into the mesogloecal cores as finger-like or trec-like, nor can evidence of communication be seen. Possibly the specimens studied are too young and small to show these features, as all specimens are considerably smaller than the largest mentioned by these authors; Kramp (1961: 332) refers to specimens up to 1,000 mm in diameter.

Among the *capillata*-group there are three species recognized by Stiasny and Maaden (1943), the principal morphological differences cited being as follows:

1. Many anastomoses present between the ramifications of the stomach-pockets in the edge-lobes.

C. purpurea Kishinouye, 1910.

Few or no anastomoses between the ramifications of the stomach-pockets in the edge-lobes . . . 2

2. Proportion of the breadth of the concentric muscle band: interval between stomach edge and periphery 1: 3-3.5. Peripheral canals more or less curved.

C. capillata (Linnaeus, 1758).

Proportion of the breadth of the concentric muscle band: interval between stomach edge and periphery 1: 1-1.75. Peripheral canals straight.

C. ferruginea Esehsholtz, 1829.

Unfortunately, in examining specimens by the criteria separating *C. capillata* and *C. ferruginea*, it is not difficult to convince oneself, with minor use of the imagination, that the peripheral canals are 'more or less curved' or 'straight', the differences being qualitative rather than quantitative. Another difficulty lies in the size criteria given by these authors (not shown in above morphological key) that *C. ferruginea* grows to 400 mm wide while *C. capillata* grows to 1,000 mm wide (i.e. 242). This is of little use in dealing with specimens of a series with widths ranging from 30-120 mm. The colour characteristics given of white, brown, blue, yellow, etc., for *C. capillata* and brownish or yellowish for *C. ferruginea* are also of little or no taxonomic value. Unfortunately, also the proportions given in the table of 1: 3-3.5 as against 1: 1.75 (Stiasny and Maaden 1943: 242) is possibly a misprint for the latter, since it is also given (p. 248) as 1: 3.75. There thus appears little justification for continuing to separate *C. capillata* and *C. ferruginea*.

As is common with *Cyanea*, there is considerable loss of tentacles from trauma or abrasion in many of the specimens. The tentacles of jellyfish frequently undergo considerable contraction with preservation, particularly when formol is used, and microscopic examination shows that some of these apparently mutilated tentacles are in fact complete.

Plate 1 shows two specimens of *C. capillata*. In fig. 1, specimen A705B shows branches of tentacles attached to their V-shaped adradial origin on the subumbrella. In fig. 2, specimen A706, the V-structures are more clearly visible. Figs. 3-4 illustrate the structure of the bell-edge.

Fig 3 is an area centred on a rhopalium, seen from the subumbrellar aspect, by transmitted light. Alongside the rhopalium are the rhopalar lappets; the one on the left is fully expanded, and extending into it are the ramifications of the body cavity, which are non-anastomosing. These extend from the rhopalar pouch, shown in part in the V-shaped central grey area. Outlining the sides of the V are portions of the radial subumbrellar musculature. On the outer side of each rhopalar lappet a light line can be seen running down through the photograph. These indicate the septa between the rhopalar and the tentacular pouches (pockets) which traverse the area of the circular muscle tissue, near the bottom of the photograph. These septa are not perforated in this species. The tentacle origins outline an adradial V-shaped area, one on each side of the photograph, the inmost part being the lower part or angle of the V, which points centrally. These lie below the tentacular pouches, which send their ramifications into the tentacular lappets at the edge of the bell.

Fig. 4 shows further detail of the rhopalium, septa and lappets. Some of the hollow tentacles, broken off short, are seen at the lower right-hand part of the photograph. Plate 2, fig. 1, shows the nematocyst-warts on the tentacle at a point away from the tip. In fig. 2 the nematocyst-warts extend to the tip of the tentacle, indicating that its functional efficiency is as good at the tip as elsewhere. In figs. 3 and 4 the nematocyst-warts are seen in greater magnification.

Occurrence

Records of this species are infrequent and this fact suggests that normally it does not penetrate inshore and into harbours during the summer (swimming) season when its occurrence would be noted. However, it was numerous enough in Port Phillip Bay in the summer of 1960-61 for its medical effects to be observed and discussed by Mitchell (1962) and Wiener (in Kramp 1965, and as quoted above). Mitchell (1962) stated that since 1882 (when Lendenfeld recorded a medusa in Port Phillip Bay as *Cyanea annaskala*) 'the jellyfish have not been seen in significant numbers, nor

apparently have they been a medical problem before in this area' and decided that 'Unusual geographical events caused the jellyfish to infest the popular swimming beaches around Port Phillip Bay . . . in the summer of 1960-61', claiming that 'Normally it inhabits a warm current situated one mile away from the coast of Australia. However, late in 1960 westerly directed winds blew the organism into Port Phillip Bay on the south coast . . .'. The source of this information was not stated. Unusual biological events could be of equal importance. *Cyanea capillata* is world-wide, and too little is known about factors influencing its distribution for dogmatic statements to be made. It occurs below as well as at the surface, and is found in cold as well as warm waters. There appears to be little or no information on its ecological preferences and movements.

Order RHIZOSTOMEAE

Family LYCHNORHIZIDAE

Genus *Pseudorhiza* Lendenfeld, 1882

Pseudorhiza haeckeli Haacke, 1884

Pl. 3, figs. 1-4; Pl. 4, figs. 1-4; Pl. 5, figs. 1-3.

For synonymy see Kramp (1965, p. 269).

Additional reference: Cleland and Southcott (1965: 95, 159).

MATERIAL: Port Phillip Survey: Area 20 (124). A 703. A. B. 2 specimens, immature; Area 5 (off Altona near Explosive Buoy, 28 March 1963). A 704 A-19 specimens. The following table lists the width of the disc against the length of the large appendage of the mouth-arms:

Specimen	Disc width (mm)	Appendage length (mm)
A703A	80	20 +
A703B	50	59
A704A (Pl. 4, figs. 1-4)	106	39 (?+)
A704B (Pl. 5, figs. 2-4)	72	76
A704C (Pl. 6, figs. 1-3)	32	26
A704D (Pl. 5, fig. 1)	95	—
A704E	87	—
A704F	82	68
A704G	66	76
A704H	46	30
A704I	53	41

As the above table indicates, in two specimens the appendage was missing, and in two others it appeared to be damaged. As Kramp (1965: 270) remarked, this appendage 'is present even in young specimens and nearly always retained

after preservation'. He recorded it missing from three specimens out of the 18 forwarded to him by the present writer from S. Australia and the N. Territory. In the present series the appendage was missing from two specimens out of a series of 11, but appeared to have been damaged in a further two specimens. The appendage may be longer or shorter than the disc width, as Kramp (*l.c.*) stated, and the above figures show. It originates not at the edge of the mouth-arm mass, but at the primary division of the mouth-arm, as was indicated by Haacke (1887).

REMARKS: Lendenfeld (1882b) recorded a new genus and species of rhizostome medusa as *Pseudorhiza aurosa* Lendenfeld, 1882, from Port Phillip Bay and near Adelaide (Lendenfeld 1884, 1887). On geographical grounds, it would appear probable that this is the same as Haacke's species. However, Stiasny (1931) examined Lendenfeld's type but was unable to solve this question, owing to the poor condition of the specimen. Kramp remarked (1965, p. 269) that the 'description is insufficient and the figure probably misleading'. In view of this Kramp (*l.c.*) retained the name *P. haeckeli* (Haacke), as have other authors.

Pseudorhiza haeckeli is confined to Australian waters where it is one of the largest and most common medusae being cast up whole or fragmented on sandy beaches, e.g. in the Adelaide region. It has been recorded from S. and S.W. Australian waters, and there is an isolated record from Arnhem Land (Kramp 1965). Despite its frequency, there does not appear to be a common name that has achieved currency. Specimens may easily be recognized by the reddish or brownish network seen in the disc of all but the smallest specimens. From the dorsal aspect the gastral filaments outline a cross, similar to that seen in *Catostylus mosaicus*. Specimens illustrated in Plate 3, fig. 3, Plate 4, figs. 1-3, and also the juvenile specimen (A704C) in Plate 5, fig. 1, show this cross clearly.

In the canal system, eight radial canals reach the bell margin (Pl. 4, figs. 1-4 and Pl. 5, fig. 1), while a further eight reach only the ring canal (Pl. 4, fig. 4, and Pl. 5, fig. 2). In each of the 16 spaces thus formed there are (usually) 8-10

centripetal unbranched blind vessels. These characteristics are part of the generic definition (Kramp 1961: 367). In each octant are six velar lappets. Eight rhopalia are present. The mouth-arms extend out about as far as the edge of the disc, as can be seen in Plate 3, figs. 1-4, Plate 4, fig. 4, and Plate 5, figs. 2-3. The nematocyst-warts are spread more or less evenly over the exumbrella, without any evidence of a circular arrangement. They are present even in young specimens, as previous authors have remarked, and are figured in Plate 5, figs. 1, 3, and less clearly for a larger specimen in Plate 4, figs. 1, 3. The appendage to the mouth-arms is three-cornered in section.

Family CATOSTYLIDAE

Genus *Catostylus* L. Agassiz, 1862

Catostylus mosaicus (Quoy and Gaimard, 1824)

Pl. 5, figs. 4-5

For synonymy see Kramp (1961: 370) (1965: 271), and in addition Cleland and Southcott (1965: 29, 91, 97, 152, 157, 160-1, 164).

MATERIAL: Port Phillip Survey: Area 13 (82) A 702. 1 specimen, disc diam. 130 mm. Area 20 (124) A1130 1 specimen immature, diam. 40 mm to disc turnover. S.A. Museum Coll.: Area 13 (Sandringham 20 Mar. 1960, coll. J. H. Barnes) A 439 2 specimens diam. of one specimen 180 mm to disc turnover (other specimen not accessible).

Dr J. H. Barnes, to whom the author is indebted, supplied the following field notes: 'Light overcast day, no wind, 5 p.m., tide falling. Thousands seen in deep water in shelter of breakwater, lesser numbers in broken water to seaward. They seem to avoid water shallower than 4 feet (1.3 m) . . . ?'.

An immature specimen A1130 is illustrated in Plate 5, figs. 4-5. This shows the external characters of the species. The mouth-arms project beyond the bell-edge, being thus in compressed material visible from above as well as below. The distal part of the mouth-arms are tapering, three-winged, blunted, without appendages.

REMARKS: This common Australian medusa is recorded for the E. coastline of Australia, from Port Phillip Bay to N. Queensland and to

the S. coast of New Guinea. It appears to be an Australian species, apart from one doubtful Philippines record (Kramp 1965: 272). It is an estuarine form, being well-known in the harbours of Melbourne, Sydney, and Brisbane, as well as further north.

Order ANTHOMEDUSAE

Family BOUGAINVILLIIDAE

Genus *Bougainvillia* Lesson, 1836

Bougainvillia ramosa (Beneden, 1844)

Pl. 6, figs. 1-4

For synonymy and definition see Russell 1953: 153-4; Kramp 1961: 81-2; Kramp 1968: 31, 34.

MATERIAL: National Museum of Victoria. Area 13 (Sandringham, coll. P. M. Hoggart, 29 Oct. 1963) 20 specimens Bell height 1.0-2.0 mm, bell width 1.0-1.7 mm.

REMARKS: The specimens correspond in Kramp's (1968: 31) key for the Hydromedusae of the Pacific and Indian Oceans. A weak peduncle is present, and the oral tentacles are branched dichotomously once. These are comparatively small specimens, as according to Russell (1953: 155) and Kramp (1968: 34) mature specimens may be 3.5 or 4 mm in bell height. This species has been widely recorded from the Atlantic and Pacific Oceans, either as the hydroid or medusa or both. This is the first record for Port Phillip Bay.

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Explanation of Plates

PLATE 1

- Fig. 1—*Cyanea capillata* L., A705B, disc diam. 116 mm subumbrellar view.
 Fig. 2—A706, disc diam. 77 mm subumbrellar view.
 Figs. 3-4—*Cyanea capillata* L., specimen A705A from Port Phillip Bay, disc diam. 116 mm to show structure of bell-edge.

PLATE 2

Cyanea capillata L. Detail of tentacle. Specimen A705A.

PLATE 3

Pseudorhiza haeckeli Haacke views of specimen A704A, disc diam. 10.6 cm.

- Fig. 1—Entire, subumbrellar view.
 Fig. 2—Further detail of subumbrellar aspect to show canal structure.
 Fig. 3—Entire, exumbrellar view.
 Fig. 4—Subumbrellar view of part of medusa to show rhopalium at the bell-edge, lying between two rhopalar lappets.

PLATE 4

Pseudorhiza haeckeli Haacke.

- Fig. 1—Exumbrellar view of specimen A704D, preserved, diam. 95 mm, lying out of water upon a black surface. The cross outlined by the gastral filaments is well shown.
 Figs. 2-4—Specimen A704B, disc diam. 72 mm.
 Fig. 2—Exumbrellar view, entire, showing internal structure of bell, also part of mouth-arms and the large appendage protruding from below disc.

Fig. 3—Exumbrellar aspect of same specimen, further enlarged, showing two rhopalia and internal detail of bell.

Fig. 4—Subumbrellar view of specimen to show canal structure of bell, also mouth-arms and the large single appendage.

PLATE 5

Pseudorhiza haeckeli Haacke, specimen A704C, juvenile, disc diam. 32 mm.

- Fig. 1—Exumbrellar view of entire specimen. Note cross outlined within bell by gastral filaments; also canal system, and pattern of exumbrellar nematocyst-warts.
 Fig. 2—Subumbrellar view. Note mouth-arms and large single appendage also canal system.
 Fig. 3—Side view of same, showing particularly the exumbrellar nematocyst-warts, mouth arms, and large mouth-arm appendage.
Catostylus mosaicus (Quoy and Gaimard), specimen A1130, juvenile, disc diam. 40 mm (to disc turnover).
 Fig. 4—Exumbrellar view. Note cross outlined by gastral filaments; also the canal system.
 Fig. 5—Subumbrellar view, showing mouth-arms and canal system.

PLATE 6

Bougainvillia ramosa (Beneden). Medusae, preserved, photomicrographs, transmitted light, to varying scales.

- Fig. 1—Specimen 1.5 mm high by 1.5 mm wide (bell measurements). Lateral view.
 Fig. 2—Specimen with bell 1.0 mm high by 1.0 mm wide, lateral, slightly oblique (towards subumbrellar) view. Note oral tentacles branched dichotomously.
 Fig. 3—Specimen with bell 1.8 mm high by 1.6 mm wide, lateral view, showing maturing gonad.
 Fig. 4—Specimen with bell 1.2 mm high by 1.2 mm wide. Oblique view, towards a subumbrellar one, showing manubrium and oral tentacles branching dichotomously.